

## AERODYNE 63

## 3-BAND A.C. SUPERHET

A SHORT-WAVE range of 16-50 metres is covered by the Aerodyne 63 4-valve (plus rectifier) A.C. 3-band superhet. This model is suitable for mains of 200-250 V, 50 C/S, and has provision for using both a gramophone pick-up and an extension speaker. There are also two alternative aerial sockets.

## CIRCUIT DESCRIPTION

Two alternative aerial input connections, **A1** direct and **A2** via series condenser **C1**, to coupling coils **L5** (S.W.), **L1** (M.W.) and **L3** (L.W.). On M.W. and L.W. input is via capacity-coupled band-pass filter. Primaries **L2** (M.W.) and **L4** (L.W.) tuned by **C21**; secondaries **L7** (M.W.) and **L8** (L.W.) tuned by **C24**; bottom coupling by **C2**, and top coupling by small condenser **C3**. On S.W. band, input is via single-tuned circuit **L6**, **C24**.

First valve (**V1**, Mullard metallised **FC4**) is an octode operating as electron coupled frequency changer. Oscillator grid coils **L9**, **L11**, **L12** tuned by **C26**; parallel trimming by **C27** (M.W.) and **C28** (L.W.); series tracking by **C7** (M.W.) and **C29** (L.W.); oscillator anode reaction by coils **L10**, **L13**.

Second valve (**V2**, Mullard metallised **VP4B**) operates as intermediate frequency amplifier with tuned primary, tuned

secondary transformer couplings **C30**, **L14**, **L15**, **C31** and **C32**, **L16**, **L17**, **C33**.

Intermediate frequency 125 KC/S. Diode second detector is part of separate double diode valve (**V3**, Mullard metallised **2D4A**). Audio-frequency component in rectified output developed across load resistance **R8** is passed via coupling condenser **C14** and manual volume control **R14** to C.G. of pentode output valve (**V4**, Brimar **7A3**). I.F. filtering by **R7**, **C10** and **R15**. Provision for connection of pick-up via **R7**, **C14**, **R14** and **R15** to grid circuit of **V4**. Variable tone control in **V4** anode circuit by R.C. filter **R17**, **C16**. Provision for connection of low impedance external speaker across secondary of **T1**.

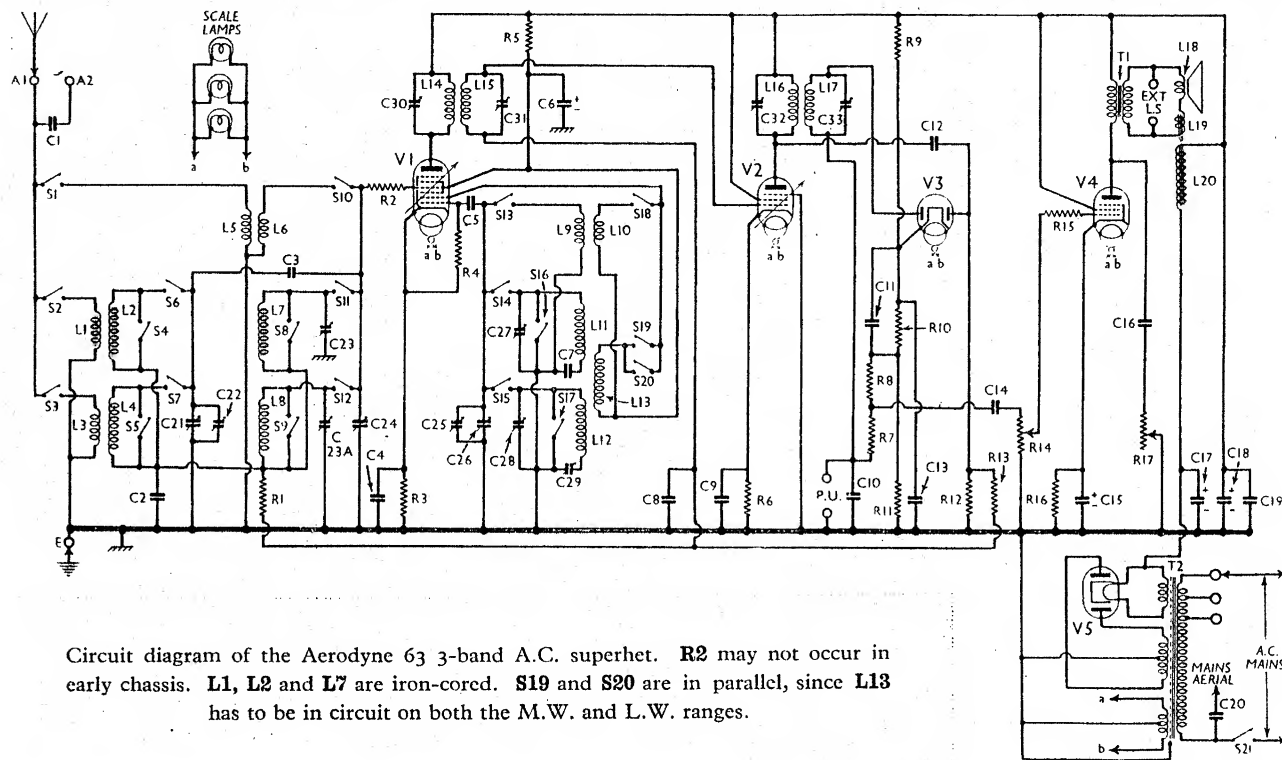
Second diode of **V3**, fed from **V2** anode via **C12**, provides D.C. potential which is developed across load resistance **R12**, and fed back through decoupling circuits as G.B. to F.C. and I.F. valves, giving automatic volume control. Delay voltage is obtained from tapping on cathode potentiometer **R9**, **R10**, **R11**.

H.T. current is supplied by I.H.C. full-wave rectifying valve (**V5**, Mullard **IW4/350**). Smoothing by speaker field coil **L20** and dry electrolytic condensers **C17**, **C18**. R.F. by-passing by **C19**, and mains aerial coupling by **C20**.

## COMPONENTS AND VALUES

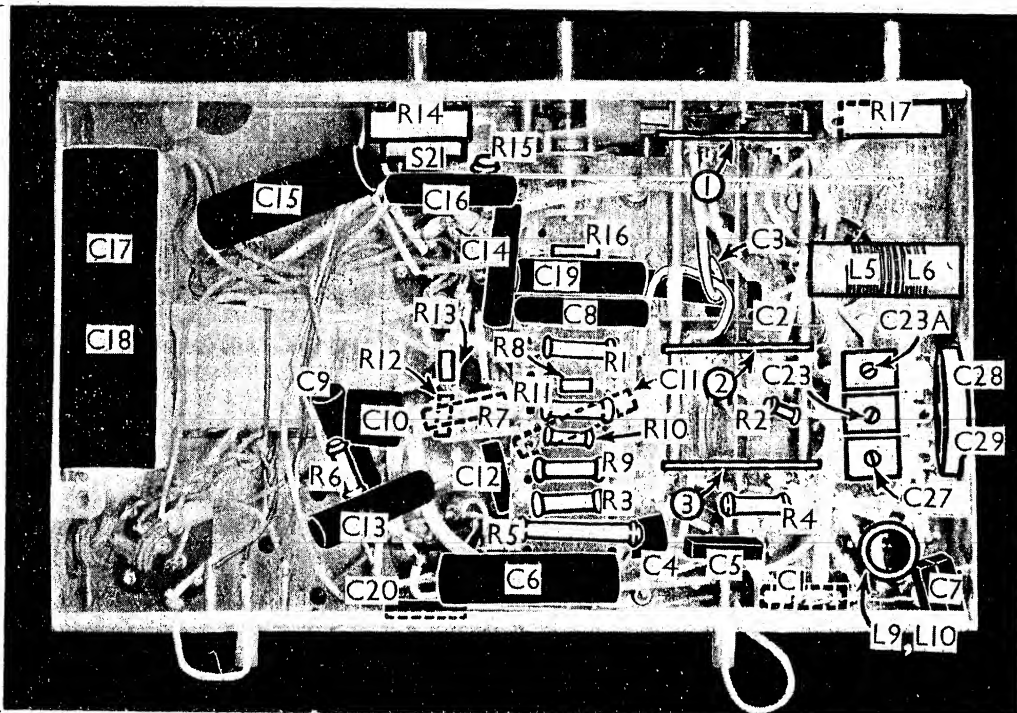
| CONDENSERS |   | Values (μF) |
|------------|---|-------------|
| C1         | Aerial series condenser                   | 0.00005     |
| C2         | V1 C.G. decoupling and B.P. coupling      | 0.05        |
| C3         | Band-pass top coupling (M.W. and L.W.)    | Very low    |
| C4         | V1 cathode by-pass                        | 0.1         |
| C5         | V1 osc. C.G. condenser                    | 0.00005     |
| C6*        | V1 S.G. by-pass                           | 2.0         |
| C7         | Osc. M.W. fixed tracker                   | 0.0018      |
| C8         | A.V.C. line decoupling                    | 0.02        |
| C9         | V2 cathode by-pass                        | 0.1         |
| C10        | I.F. by-pass                              | 0.0003      |
| C11        | V3 cathode by-pass                        | 0.1         |
| C12        | Coupling to V3 A.V.C. diode               | 0.00005     |
| C13        | V3 cathode by-pass                        | 0.1         |
| C14        | L.F. coupling to V4                       | 0.05        |
| C15*       | V4 cathode by-pass                        | 25.0        |
| C16        | Tone control condenser                    | 0.02        |
| C17*       | H.T. smoothing                            | 8.0         |
| C18*       | H.T. line R.F. by-pass                    | 8.0         |
| C19        | Mains aerial coupling                     | 0.0002      |
| C21†       | Band-pass pri. tuning (M.W. and L.W.)     | 0.00044     |
| C22†       | Band-pass pri. trimmer                    | —           |
| C23†       | Band-pass sec. trimmer (M.W.)             | 0.000035    |
| C23A†      | Band-pass sec. trimmer (L.W.)             | 0.000035    |
| C24†       | Band-pass sec. and S.W. grid circ. tuning | 0.00044     |
| C25†       | Osc. main trimmer                         | —           |
| C26†       | Osc. circuit tuning                       | 0.00044     |
| C27†       | Osc. M.W. trimmer                         | 0.000035    |
| C28†       | Osc. L.W. trimmer                         | 0.000035    |
| C29†       | Osc. L.W. tracker                         | 0.0008      |
| C30†       | 1st I.F. trans. pri. tuning               | 0.00014     |
| C31†       | 1st I.F. trans. sec. tuning               | 0.00007     |
| C32†       | 2nd I.F. trans. pri. tuning               | 0.00007     |
| C33†       | 2nd I.F. trans. sec. tuning               | 0.00014     |

\* Electrolytic. † Variable. ‡ Pre-set.



Circuit diagram of the Aerodyne 63 3-band A.C. superhet. **R2** may not occur in early chassis. **L1**, **L2** and **L7** are iron-cored. **S19** and **S20** are in parallel, since **L13** has to be in circuit on both the M.W. and L.W. ranges.

Under - chassis view. C28 and C29 are adjustable through holes in the side of the chassis. R7 is enclosed in insulating sleeving. C11 is completely, and C4 partly below the paxolin component strip in the centre of the chassis. C3 is a small condenser formed of looped wires.



| RESISTANCES |                                    | Values (ohms) |
|-------------|------------------------------------|---------------|
| R1          | V1 C.G. decoupling                 | 500,000       |
| R2          | V1 pent. C.G. stabiliser           | 140           |
| R3          | V1 fixed G.B. resistance           | 250           |
| R4          | V1 osc. C.G. resistance            | 50,000        |
| R5          | V1 S.G. and osc. anode H.T. feed   | 30,000        |
| R6          | V2 fixed G.B. resistance           | 200           |
| R7          | I.F. stopper                       | 50,000        |
| R8          | V3 signal diode load               | 1,000,000     |
| R9          | A.V.C. delay voltage potentiometer | 100,000       |
| R10         |                                    | 300           |
| R11         |                                    | 5,000         |
| R12         | V1 A.V.C. diode load               | 1,000,000     |
| R13         | A.V.C. line decoupling             | 1,000,000     |
| R14         | Manual volume control              | 500,000       |
| R15         | V4 grid I.F. stopper               | 50,000        |
| R16         | V4 G.B. resistance                 | 140           |
| R17         | Variable tone control              | 50,000        |

| OTHER COMPONENTS |                                    | Approx. Values (ohms) |
|------------------|------------------------------------|-----------------------|
| 1                | Aerial coupling coil (M.W.)        | 0.3                   |
| 2                | Band-pass primary coil (M.W.)      | 1.3                   |
| 3                | Aerial coupling coil (L.W.)        | 15.2                  |
| 4                | Band-pass primary coil (L.W.)      | 14.9                  |
| 5                | Aerial coupling coil (S.W.)        | 0.3                   |
| 6                | Aerial tuning coil (S.W.)          | Very Low              |
| 7                | Band-pass sec. coil (M.W.)         | 1.3                   |
| 8                | Band-pass sec. coil (L.W.)         | 14.9                  |
| 9                | Osc. tuning coil (S.W.)            | Very low              |
| 10               | Osc. reaction coil (S.W.)          | 2.3                   |
| 11               | Osc. tuning coils (M.W. and L.W.)  | 3.3                   |
| 12               |                                    | 10.0                  |
| 13               | Osc. reaction coil (M.W. and L.W.) | 4.0                   |
| 14               | 1st I.F. trans. Pri.               | 70.0                  |
| 15               |                                    | 100.0                 |
| 16               | 2nd I.F. trans. Pri.               | 100.0                 |
| 17               |                                    | 70.0                  |
| 18               | Speaker speech coil                | 1.7                   |
| 19               | Hum neutralising coil              | 0.08                  |
| 20               | Speaker field coil                 | 1,650.0               |
| 1                | Speaker input trans. Pri.          | 730.0                 |
|                  |                                    | 0.2                   |
|                  | Sec.                               | 25.0                  |
|                  | Heater sec.                        | 0.05                  |
|                  | Rect. heat. sec.                   | 0.1                   |
|                  | H.T. sec. (total)                  | 540.0                 |
| 20               | Waveband switches                  | —                     |
| 1                | Mains circ. switch, ganged R14     | —                     |

### DISMANTLING THE SET

**Removing Chassis.**—If it is desired to remove the chassis from the cabinet, remove the four control knobs (recessed grub screws) and the four bolts (with washers and rubber washers) holding the chassis to the bottom of the cabinet. Now remove the two round-head wood screws holding the top of the tuning dial to the cabinet front, when the chassis can be withdrawn to the extent of the speaker leads, which is sufficient for normal purposes.

To free the chassis entirely, unsolder the speaker leads and when replacing, connect them as follows, numbering the tags from bottom to top: 1 and 2 joined together, red; 3, white; 4, green.

**Removing Speaker.**—To remove the speaker from the cabinet, slacken the four clamps holding it to the sub-baffle (nuts and lock nuts) and remove the two round-head wood screws (with washers). When replacing, see that the transformer is on the right.

### VALVE ANALYSIS

| Valve      | Anode Voltage (V) | Anode Current (mA) | Screen Voltage (V) | Screen Current (mA) |
|------------|-------------------|--------------------|--------------------|---------------------|
| V1 6C4*    | 270               | 1.4                | 80                 | 3.9                 |
| V2 VP4B    | 270               | 8.8                | 270                | 4.3                 |
| V3 2D4A    | —                 | —                  | —                  | —                   |
| V4 7A3     | 250               | 31.0               | 270                | 5.6                 |
| V5 1W4 350 | 320†              | —                  | —                  | —                   |

\* Oscillator anode (G2) 80 V, 2.1 mA.

† Each anode, A.C.

Valve voltages and currents given in the table above are those measured in our receiver when it was operating on mains of 230 V, and with the transformer adjusted to that voltage. The receiver was tuned to the lowest wavelength on the

medium band and the volume control was at maximum, but there was no signal input.

Voltages were measured on the 1,200 V scale of an Avometer, chassis being negative.

### GENERAL NOTES

**Switches.**—S1-S20 are the wavechange switches, in three rotary units beneath the chassis, indicated in our under-chassis view. The units are shown in detail in the diagrams on page VIII, as seen from the under-side of the chassis, in the directions of the arrows in the under-chassis view.

The table (p. VIII) gives the switch positions for the three control settings, starting from the fully anti-clockwise position, O indicates open, and C closed.

S21 is the Q.M.B. mains switch, ganged with the volume control, R14.

**Coils.**—L1-L4; L7, L8 and L11-L13 are in three screened units on the chassis deck. L5, L6 and L9, L10 are on two separate unscreened tubular formers beneath the chassis. The thick wire windings are L6 and L9 respectively. The I.F. transformers L14, L15 and L16, L17 are in two further screened units on the chassis deck, containing also the trimmers C30-C33.

**Scale Lamps.**—These are three Osram M.E.S. types, rated at 6.2 V, 0.3 A.

**External Speaker.**—Two sockets are provided on a panel on the internal speaker transformer for a low resistance (20) external speaker.

**Condensers C17, C18.**—These are two

*Continued overleaf*

## AERODYNE 63—Continued

8 $\mu$ F electrolytics in a single carton beneath the chassis, having a common negative (black) lead. The red lead to the screen socket of V4 valve-holder is the positive of C18, and the red lead to socket 1, the positive of C17.

**Gang Condenser.**—Note that there is no trimmer for the centre section (C24) mounted on the gang, but its place is taken by the trimmers C23 and C23A mounted, with C27, beneath the chassis.

**Tracker C7.**—The M.W. fixed tracker consists of two fixed condensers in parallel in our chassis to make up the required capacity.

**Condenser C3.**—This is a very small condenser formed of a loop of insulated wire round another wire, indicated in our under-chassis view. It is not shown in the makers' diagram.

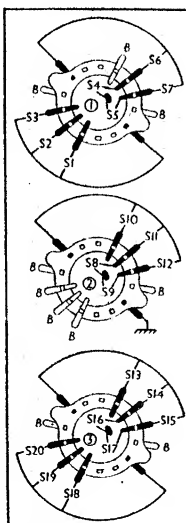
**Condensers C28, C29.**—These are adjusted through holes in the right-hand side of the chassis.

**Chassis Divergencies.**—C10 in early models was 0.0001  $\mu$ F, not 0.0003  $\mu$ F. Two extra condensers, of 0.1  $\mu$ F and 0.001  $\mu$ F were incorporated in the circuit. C14 was 0.01  $\mu$ F, not 0.05  $\mu$ F. R2 was not included in early chassis. V4 was a Mullard Pen4VB, and V5 was a Mullard LW3 in some models.

## CIRCUIT ALIGNMENT

**I.F. Stages.**—Connect a signal generator to grid (top cap) of V1, and chassis. Feed in a 125 KC/S signal, and adjust

Switch diagrams looking from the rear of the underside of the chassis. The numbers in circles correspond with those in the under-chassis view. Each unit contains two shorting switches, the common moving contact in each case being fitted to the rotors.



SWITCH TABLE

| Switch | I.W. | M.W. | S.W. |
|--------|------|------|------|
| S1     | O    | O    | C    |
| S2     | O    | C    | O    |
| S3     | C    | O    | O    |
| S4     | O    | O    | C    |
| S5     | O    | C    | O    |
| S6     | O    | C    | O    |
| S7     | C    | O    | O    |
| S8     | O    | O    | C    |
| S9     | O    | C    | O    |
| S10    | O    | O    | C    |
| S11    | O    | C    | O    |
| S12    | C    | O    | O    |
| S13    | O    | O    | C    |
| S14    | O    | C    | O    |
| S15    | C    | O    | O    |
| S16    | O    | O    | C    |
| S17    | O    | C    | O    |
| S18    | O    | O    | C    |
| S19    | O    | C    | O    |
| S20    | C    | O    | O    |

output. Feed in a 1,900 m. signal, tune to 1,900 m. on scale, and adjust C29 (side of chassis) for maximum output, meanwhile rocking the gang slightly.

C30, C31, C32 and C33 for maximum output. Re-check.

**R.F. and Oscillator Stages.**—Connect signal generator to A2 and E sockets.

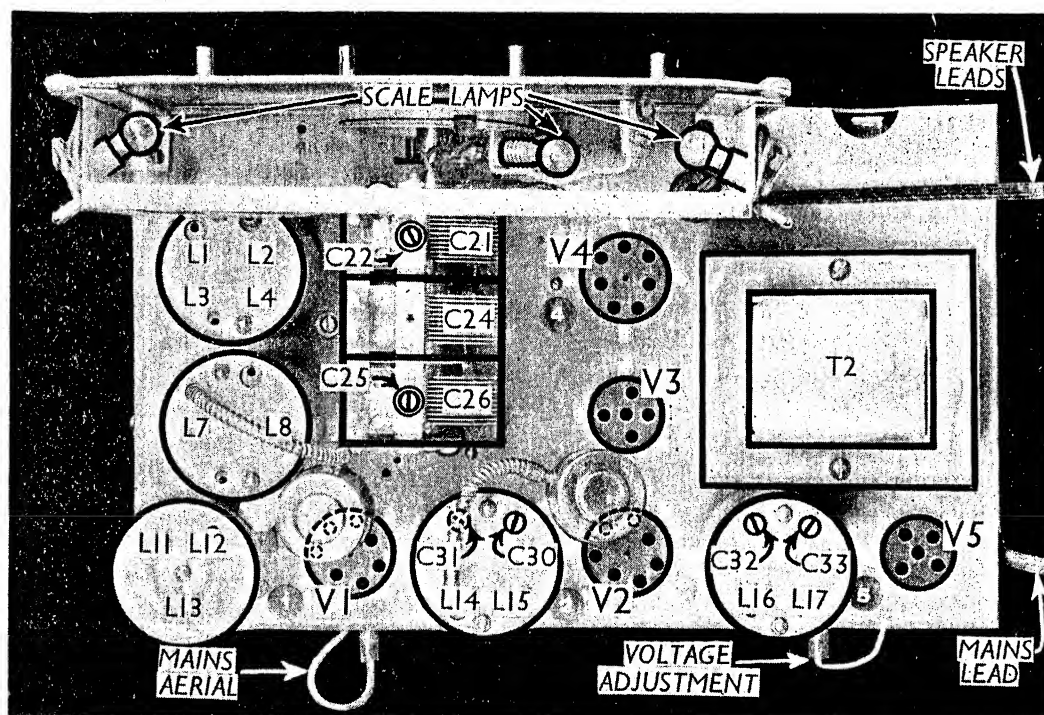
**S.W.**—Switch set to S.W., feed in a 16 m. signal, tune to 16 m. on scale, and adjust C25 for maximum output. Then feed in a 40 m. signal, tune it in, and adjust the movable turn at the tag end of L6 for maximum output, if necessary.

**M.W.**—Feed in a 210 m. signal, tune to 210 m. on scale, and adjust C27 for maximum output. Then adjust C23 and C22 similarly.

**L.W.**—Feed in a 1,300 m. signal, tune to 1,300 m. on scale and adjust C28 (side of chassis) and C23A for maximum

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Plan view of the chassis. Note that C24 has no trimmer mounted on the gang, but C23 and C23A, shown in the under-chassis view, are associated with it. The three scale lamps are in parallel, the centre one rotating with the tuning drive.